

## Claim

1. A perpendicular recording medium comprising a soft magnetic underlayer (hereinafter referred to as "SUL") and a perpendicular recording layer formed on said SUL, wherein said SUL consists of a soft magnetic material composed of FeSiAlN.
2. The perpendicular recording medium according to claim 1, wherein said soft magnetic material contains 5 – 11 atomic % of N.
3. The perpendicular recording medium according to claim 2, wherein said soft magnetic material contains respectively 69 – 85 atomic % of Fe, 5 – 10 atomic % of Si and 5 – 10 atomic % of Al.
4. The perpendicular recording medium according to claims 1, 2 or 3, wherein the average diameter of the crystal grains of said SUL is 7nm or less.
5. The perpendicular recording medium according to any one of claims 1 – 4, wherein the stabilization energy of the banded magnetic domain obtained from the hysteresis curves of the magnetic property of said SUL is  $1 \times 10^3$  erg / cm<sup>3</sup> or less.
6. The perpendicular recording medium according to any one of claims 1 – 5, wherein surface roughness of said SUL is 0.6 nm or less when the film thickness thereof is within the limits of 50 – 500 nm.
7. A magnetic recording apparatus comprising the perpendicular recording medium according to any one of the claims 1 – 6.
8. A method of producing perpendicular recording media each comprising a SUL and a perpendicular recording layer formed on said SUL, wherein the process of forming said SUL consists of depositing on the substrate the surface temperature of which is kept not higher than 200°C, a base material containing at least Fe, Si and Al and an inert gas containing nitrogen (N<sub>2</sub>) gas.
9. An apparatus for producing perpendicular recording media each comprising a SUL and a perpendicular recording layer formed on said SUL, wherein a deposition chamber or chambers is or are provided for introducing therein a base material containing at least Fe, Si and Al and an inert gas containing nitrogen (N<sub>2</sub>) gas and for depositing said SUL on the substrate the surface temperature of which is kept not higher than 200°C.

10. The apparatus for producing perpendicular recording media according to claim 9, wherein said deposition chamber or chambers is or are provided with a control means for controlling the surface temperature of said substrate.